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(58) Field of search

UK CL (Edition J) C1H
 INT CL^a C04B

(54) **Cement/sand composition for covering surfaces**

(57) A compound for providing a covering to a substrate, e.g. concrete slabs, contains a mixture of cement and sand forming a major portion of the compound, the minor portion including constituents enabling the compound when mixed with a predetermined quantity of water to be applied as a relatively thin layer to the substrate, the covering when set being durable and weather resistant.

A first said constituent may comprise a polymer which polymerises when the compound is mixed with water, e.g. acetate-ethylene copolymer. A second said constituent may control water distribution in the compound, e.g. methyl hydroxyethyl cellulose. A third said constituent may be a plasticizer, e.g. sulphonated melamine-formaldehyde resin. A fourth said constituent may be an air entrainer, e.g. an alkyl benzene sulphonate salt. The compound may also contain reinforcing fibres, e.g. of polypropylene, a constituent, e.g. microsilica, which facilitates extrudability and a waterproofing compound.

A flexible bag for containing the compound is described.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1982.

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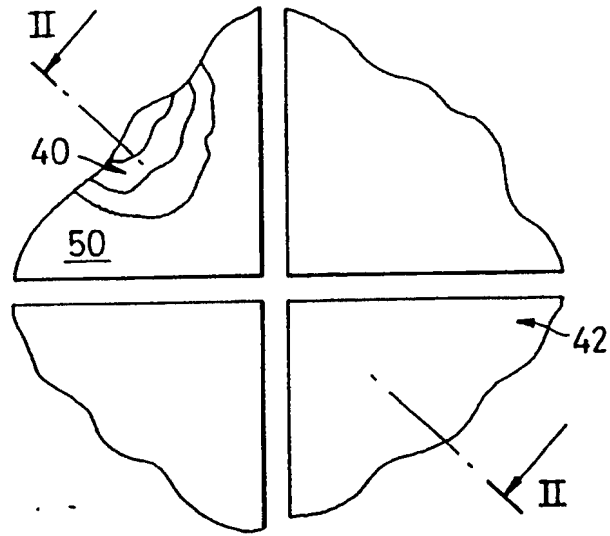


Fig. 1

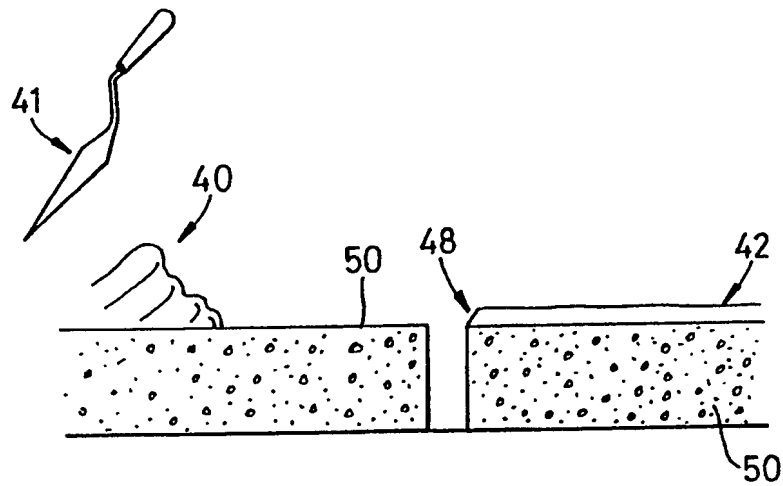


Fig. 2

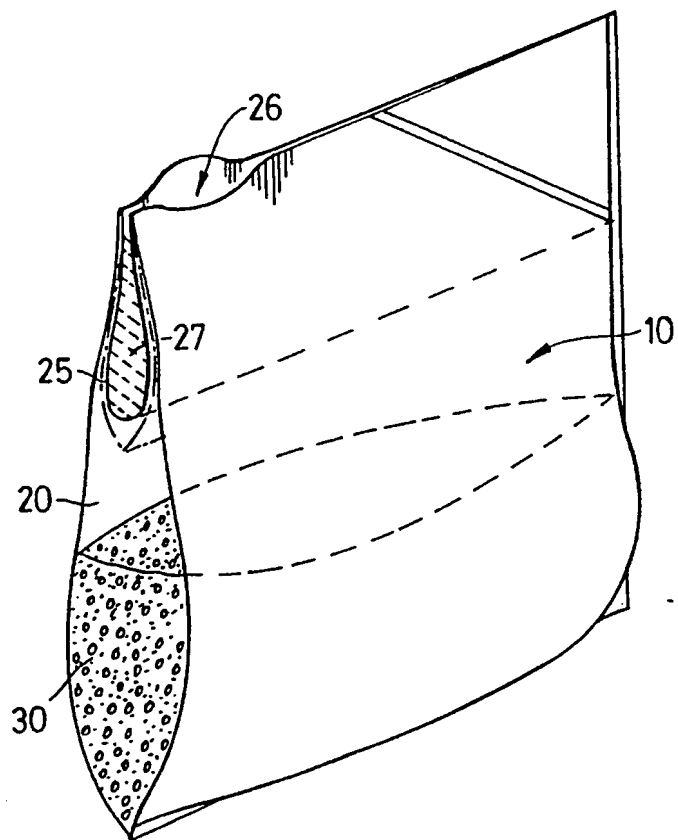


Fig. 3

A COMPOUND FOR COVERING A SUBSTRATE

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The present invention relates to a compound for covering a substrate, such as a ground base and a method of covering such a substrate.

Concrete slabs are widely used as a ground base, for example to form a patio or pathway. After exposure to weather these concrete slabs tend to deteriorate in that colours fade and surface cracks, pit holes etc may appear. Whilst such deterioration detracts from the aesthetic appearance of the concrete slabs they continue to provide a sound ground base. An aim of the present invention is to provide a compound which can be applied to an existing ground base so as to provide a covering surface layer and thereby give a new aesthetic appearance to the base.

According to one aspect of the present invention there is provided a compound for mixing with water to provide a surface covering to a substrate, the compound containing a mixture of cement and sand forming a major portion of the compound, the remaining minor portion of the compound including constituents capable of enabling the compound when mixed with a predetermined quantity of water to be applied as a relatively thin layer to the substrate, the surface covering when set adhering to the substrate so as to provide a durable, weather resistant covering.

The minor portion of the composition preferably includes a first constituent capable of providing adhesion between the surface covering and the substrate whilst the compound sets. In this way the wet composition may be applied thinly and delamination and hollows which may be created during setting of the compound can be avoided or substantially reduced. Preferably the first constituent is a polymer which polymerises when the compound is mixed with water. After setting the presence of the polymer enhances the covering layers resistance to water penetration and thereby reduces the likelihood of frost damage. Preferably

the polymer is an acetate-ethylene copolymer such as CORMIX POLYMER 88/28A, and preferably constitutes between 0.1% to 10% by weight of the compound.

The minor portion of the compound preferably includes a second constituent for controlling water distribution throughout the compound after mixing with water. In this way a homogeneous mixture is maintained whilst the cement sets. In addition, premature drying of the surface covering adjacent to the substrate, due to migration of water to the surface of the surface covering, is resisted and accordingly the cement adjacent to the substrate is able to set slowly and provide good adhesion with the substrate.

Preferably the second constituent is a water soluble ether such as methyl-hydroxyethyl cellulose, (for example TYLOSE P6000 2Z), and preferably constitutes between 0 to 5% by weight of the compound.

The minor portion of the compound preferably includes a third constituent which enables the amount of water needed to be mixed with the compound to be reduced to a desired level, say 5% by weight, and yet provide a workable wet homogeneous composition which is spreadable but non-flowable. Reduction of the water content improves the strength and durability of the set cement. Preferably the third constituent is a plastersizer, preferably a sulphanated melamine formaldehyde resin such as CORMIX No 5 and preferably constitutes between 0% to 10% by weight of the compound. The plastersizer also improves the short term strength and setting time of the cement.

The minor portion of the compound preferably includes a fourth constituent comprising an air entrainer which serves to entrain small air bubbles into the wet composition created after mixing the compound with water. The air bubbles serve to facilitate manipulation of the compound when mixing with water and improves the spreadability or

extrudability of the wet composition when applying it to the substrate. In addition, the small air bubbles remain trapped after setting and thereby serve to reduce the thermal conductivity of the surface covering. Accordingly the surface covering tends to act as an insulator and, therefore, reduces the rate of heat transference to/from the substrate under hot/cold weather conditions. This serves to reduce the likelihood of shearing of the bond between the surface covering and substrate caused by relative expansion therebetween.

Preferably the fourth constituent comprises salts of alkylbenzene sulphonates (such as CORMIX 8833 and 8834) and preferably constitutes between 0% to 5% by weight of the compound.

The minor portion of the compound may include a colouring agent which is provided in sufficient quantity to provide the desired colouration.

The minor portion may include reinforcing fibres, such as polypropylene, which are fine stretched fibres chopped into short lengths. These fibres assist in preventing break up of the surface covering. Preferably such fibres constitute between 0 to 5% by weight of the compound and are preferably incorporated when the proportion of cement to sand used is high i.e. in the region of 1 part sand: 1 part cement.

The minor portion may include a fifth constituent for facilitating extrudability of the wet composition, such as micro silica. Preferably the fifth constituent constitutes between 0 to 10% by weight of the compound.

The minor portion may include a sixth constituent comprising a waterproofing compound for improving the surface covering's resistance to water penetration.

The cement constituent in the compound is preferably a hydraulic cement such as Portland cement and the sand constituent is preferably a washed sand. The sand is preferably a fine graded sand to provide a smooth appearance to the surface covering although a coarse sand can be used if desired.

The major portion of the compound preferably constitutes at least 95% by weight of the compound, more preferably about 97% by weight. The ratio of the sand and cement preferably ranges between 1 part of sand: 1 part of cement to 5 parts of sand: 1 part of cement.

The cement constituent preferably constitutes about 20% to 50% by weight of the compound, more preferably about 28% by weight.

The sand constituent of the compound preferably constitutes about 50% to 60% by weight of the compound, more preferably about 70% by weight.

A specific example of a compound according to the present invention which has been found to be acceptable for thinly covering concrete slabs is listed below, the percentage figures quoted being percentage by weight of the compound.

Fine sand	69.00%
Cement	28.00%
Acetate-ethylene copolymer	01.00%
Methyl-hydroxethyl cellulose	00.25%
Plastersizer (sulphanated melamine formaldehyde resin)	01.00%
Air Entrainer	00.25%
Colouring agent	00.50%

The above compound is mixed with a predetermined quantity of water to provide a wet composition which is spreadable and non-flowable. The amount of water is chosen to give a water:cement ratio of between 0.3:1 to 0.6:1 by weight. Accordingly, the wet composition can be applied to a prepared substrate by spreading it thinly over the surface of the substrate and since the wet composition is non-flowable it remains in position whilst the setting procedure takes place. This enables controlled application of the wet composition to be achieved and also enables decorative finishes to be sculptured in the surface covering. The compound of this example is particularly suitable for mixing in a container, such as for example of the type disclosed in UK patent 2096570B, from which it is extruded for application to the substrate.

An example of a method of covering a substrate using a compound according to the present invention is described below, with reference to the accompanying drawings, in which:-

Figure 1 is a schematic part plan view of a plurality of side by side concrete slabs

Figure 2 is a schematic sectional side view taken along line II-II in Figure 1

Figure 3 is a schematic perspective view partly broken away, of a preferred package for containing the compound of the present invention.

Referring initially to Figure 3, the package 10 comprises a bag made from flexible waterproof film material and includes a compartment 20 and a pocket 25 within the bag. The bag illustrated in Figure 3 is of the type disclosed in UK patent 2096570B and reference should be made thereto for a more detailed description of the bag.

The compartment 20 is filled with a predetermined quantity of the compound 30 according to the present invention which is intimately mixed in a dry condition and is supplied in that condition to the user. When the compound is to be used, the pocket 25 is filled with water through mouth 26, the size of the pocket 25 being manufactured to provide the desired volume of water for mixing with the compound. After filling of the pocket 25 with water 27, the pocket is ruptured to enable water to flow into the compartment and enable mixing with the compound to take place.

The substrate to be covered, which in the present example is a series of concrete slabs, is prepared for reception of the wet composition created by mixing the compound with water. Such preparation preferably includes a basic cleaning operation such as for example removal of all loose surface debris, cleaning out of material between the slabs, treatment of the slabs with solutions for removal of fungus, algae, etc. Once the cleaning operation is completed, the surface of the slabs is preferably dampened with water prior to application of the wet composition.

Application of the wet composition is conveniently achieved by extruding a desired amount 40 of the composition from the bag onto a central portion of a slab 50 and then using an implement such as a trowel 41 to spread the composition thinly over the entire surface of the slab to define a thin surface covering layer 42. Since the wet composition is of a spreadable, non-flowable, consistency (ie a buttery consistency) it is possible to spread the composition up to the edges of each slab and maintain a sharp, clean, edge definition by slightly chamfering the covering layer as indicated at 48 in Figure 2. In addition it is possible to sculpture desired surface patterns in the covering layer.

Whilst the invention has been described above in relation to applying a surface covering to a ground base such as concrete slabs, it will be appreciated that other types of concrete ground bases may be covered also. Furthermore the substrate needn't necessarily be a ground base but could be any base, such as a wall, which require covering with a durable, thin walled surface covering.

As described above, the compound 30 is supplied ready mixed in a dry condition. It is to be appreciated that the various constituents could be packages individually in predetermined quantities for mixing by the end user.

CLAIMS

1. A compound for mixing with water to provide a surface covering to a substrate, the compound containing a mixture of cement and sand forming a major portion of the compound, the remaining minor portion of the compound including constituents capable of enabling the compound when mixed with a predetermined quantity of water to be applied as a relatively thin layer to the substrate, the surface covering when set adhering to the substrate so as to provide a durable weather resistant covering.
2. A compound according to claim 1 wherein the minor portion contains a first constituent which provides adhesion between the surface covering and the substrate whilst the compound sets.
3. A compound according to claim 2 wherein the first constituent is a polymer which polymerises when the compound is mixed with water.
4. A compound according to claim 3 wherein the polymer is an acetate-ethylene copolymer and constitutes between 0.1% to 10% by weight of the compound.
5. A compound according to claim 4 wherein the polymer constitutes about 1% by weight of the compound.
6. A compound according to any preceding claim wherein the minor portion contains a second constituent for controlling water distribution throughout the compound after mixing with water.

7. A compound according to claim 6 wherein the second constituent is a water soluble cellulose ether and constitutes less than 5% by weight of the compound.
8. A compound according to claim 7 wherein the water soluble cellulose ether constitutes about 0.1% by weight of the compound.
9. A compound according to any preceding claim wherein the minor portion includes a third constituent for reducing the amount of water needed to be mixed with the compound.
10. A compound according to claim 9 wherein the third constituent comprises a plastersizer, preferably a super plastersizer.
11. A compound according to any preceding claim wherein the minor portion includes a fourth constituent which serves to entrain small air bubbles into the wet composition.
12. A compound according to claim 11 wherein the fourth constituent comprises an air entrainer and constitutes less than 5% by weight of the compound.
13. A compound according to any preceding claim wherein the minor portion includes a fifth constituent for facilitating extrudability of the wet composition.
14. A compound according to claim 13 wherein the fifth constituent comprises micro silica and constitutes less than 10% by weight of the compound.
15. A compound according to any preceding claim wherein the minor portion includes a water proofing compound which constitutes less than 5% by weight of the compound.

16. A compound according to any preceding claim wherein the minor portion includes reinforcing fibres.

17. A compound according to any preceding claim wherein the cement constitutes 20% to 50% by weight of the compound.

18. A compound according to claim 17 wherein the sand constitutes 50% to 80% by weight of the compound.

19. A compound according to claim 18 wherein the ratio of sand and cement ranges between 1 part of sand:1 part of cement to 5 parts of sand:1 part of cement.

20. A compound substantially as described herein with reference to and as exemplified in the examples.

21. A method of covering the surface of a substrate, the method including mixing a compound according to any preceding claim with a predetermined quantity of water to form a wet composition, and spreading the wet composition thinly over the surface of the substrate to define a thin surface covering.

22. A method according to claim 21 wherein the compound is packaged in a flexible bag and the compound is mixed with water whilst contained within the bag, the wet composition is then applied to the substrate by extrusion from the bag.

23. A method of covering the surface of a substrate substantially as described herein with reference to the examples and the drawings.